

Saving the World's Flowers

New genebank preserves flower germplasm gathered from the four corners of the globe.



PEGGY GREB (K11367-1)

David Tay, director of the ARS Ornamental Plant Germplasm Center, inspects some of the more than 500 *Pelargonium* accessions in the center's collection. The *Pelargonium* genus, in the geranium family, comprises more than 250 species.

The fate of the gene pool for the asters and mums that grace many fall gardens rests in seed coolers, greenhouses, and fields at Ohio State University (OSU) in Columbus, backed up by the vaults of the National Center for Genetic Resources Preservation in Fort Collins, Colorado.

Asters and mums are among the Ornamental Plant Germplasm Center's (OPGC) top-30 priority genera to collect, as are the poinsettias so popular in December. New varieties of these and other flowers could result from plant breeders' use of previously unavailable genes from the center's growing collection.

The center recently marked its third anniversary on the university's campus. It boasts a modern, 6,000-square-foot office/laboratory complex and an 11,500-square-foot greenhouse. Center scientists search the world for valuable plant materials, including the collections of serious plant hobbyists.

As director of OPGC, David Tay is building a genebank to safeguard the

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Research assistants Eric Renze (left) and Art Wells (center) and director David Tay take care of flowering plants in OPGC's greenhouse. Genetic material from the plants will be preserved for the future.

gene pool of flowering plants worldwide. It is one of the few specialized genebanks for flowers in the world. The center collects seed, bulbs, cuttings, and tissue, mainly from wild relatives of commercial species and heirloom varieties that are no longer available.

Otherwise, seeds and other materials from varieties no longer on the market would be thrown away—and with them, a portion of the flower gene pool. Preservation of flower germplasm has become even more important today, as concentrated breeding narrows the genetic diversity of many popular flowers by focusing on aesthetics.

OPGC is a joint effort involving the Agricultural Research Service, OSU (through the Ohio Agricultural Research and Development Center), and the American floriculture industry. It was established because of increasing awareness over the past decade of both the threat of a dwindling gene pool and the importance of the floriculture industry as a growing sector of agriculture vital to the



Curator Jennifer Ehrenberger checks growth of a meristem tissue culture, a technique used to conserve certain types of plants, like *Pelargonium*.

economies of many states, like Ohio. Nationally, floriculture is a \$13-billion-a-year industry. Globally, it's about a \$50-billion-a-year business. Yet relatively few resources have been devoted to protecting the gene pools of flowering plants. The germplasm center helps fill this void.

OPGC is the newest addition to the U.S. National Plant Germplasm System, which began in 1946, is managed by ARS, and maintains 25 genebanks across the country. Its Fort Collins, Colorado, facility keeps duplicates of every ARS plant collection in highly secure storage.

"It is critical to give breeders all possible options in the future," Tay says. "There may be genes that can help plants survive climate changes, drought, and pests, and other genes could have medicinal value for people and animals. We are working closely with OSU's College of Pharmacy to explore medicinal uses."

New Tissue Culture Lab

This year, Tay hired Jennifer Ehrenberger to curate a collection of vegetatively propagated plants. She spent her first months mainly contacting botanical gardens around the world to build up a

network for exchanging plant materials. She also built a tissue culture laboratory and, since April, has been preserving and multiplying sterile cultures of daylilies, geraniums, and other flowers.

Susan Stieve is in her third year of curating flowers propagated by seeds. She now has more than 1,500 plant accessions from around the world. Stieve and Tay hosted the 2003 National Floriculture Forum, where breeders and industry representatives shared information to improve germplasm and breeding.

Tay intends to choose the best technologies for preserving plant materials, drawing on the experience of other members of the national germplasm system. He is also working with Charles R. Krause, who's in the ARS Application Technology Research Unit, in Wooster, Ohio, to see whether DNA markers used in crops such as tomato and rice can be adapted to identify flower species, starting with begonias and geraniums.

Zinnia and Marigold Seed Quality

Samuel Contreras, one of seven OSU graduate students working with OPGC, is studying how temperature and water availability during seed production affect the quality of zinnia and marigold seeds. "Seed quality includes storability, which is especially important to OPGC," says Contreras, a Fulbright scholar.

Contreras came to the center from the Pontifical Catholic University of Chile, where he worked as a professor of seed biology and production. "Chile is the sixth-largest exporter of seeds in the world," Contreras notes. He is pursuing a Ph.D. in seed biology.

"Chile is also one of many countries in the world that does not have the resources for germplasm conservation, so OPGC provides a way to save their native species' germplasm," Contreras says. "The germplasm will probably be useful in the future to develop new, improved varieties, which is a benefit to any country." Many of the major flowers now grown in the United States came from other countries, so their wild relatives are also found overseas.

"Not only does this research benefit OPGC and OSU, but it benefits flower



Curator Susan Stieve cleans seeds from a snapdragon (*Antirrhinum*) accession before storing them in the genebank.

growers around the world—as well as the entire scientific community involved in related work," Contreras says.

He hopes that foreign students like himself who study at the center will encourage their countries to exchange plant material with it. "My personal opinion is that there is a misunderstanding in some countries that germplasm centers are trying to steal their national germplasm," Contreras says. "We can help change attitudes. Then we can expect more collaboration between different countries and OPGC. At the same time, those countries will take advantage of the benefits OPGC can give them, such as diverse germplasm and technological help to improve flower varieties."—By **Don Comis, ARS.**

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